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Reducing the Number of Specimens Needing Rejection at the Kaiser Permanente Regional Laboratory

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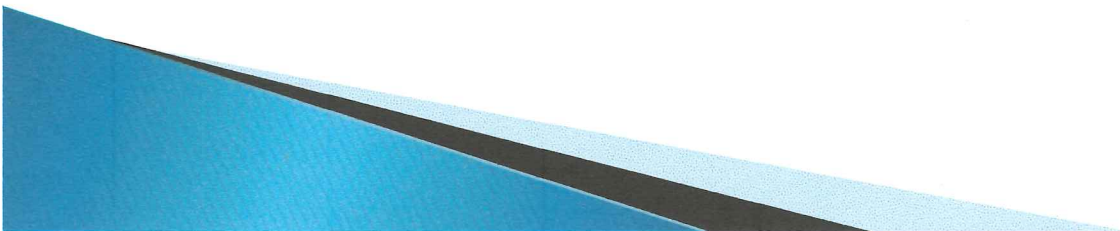
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Reducing the Number of Specimens Needing Rejection at the Kaiser Permanente Regional Laboratory

Kaiser Permanente
Loyola Marymount University
Angela Varela
Spring 2015

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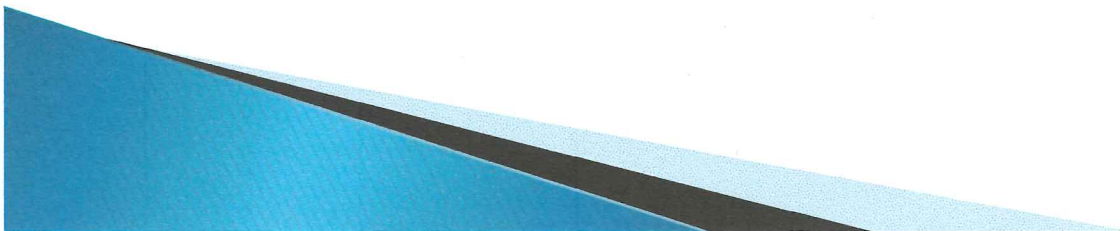
- ▶ Customer and Value
- ▶ Current State Map
- ▶ Samples Rejected at Regional Lab (stats)
- ▶ Samples Rejected at Local Labs (stats)
- ▶ Future and Ideal State
- ▶ Implementation
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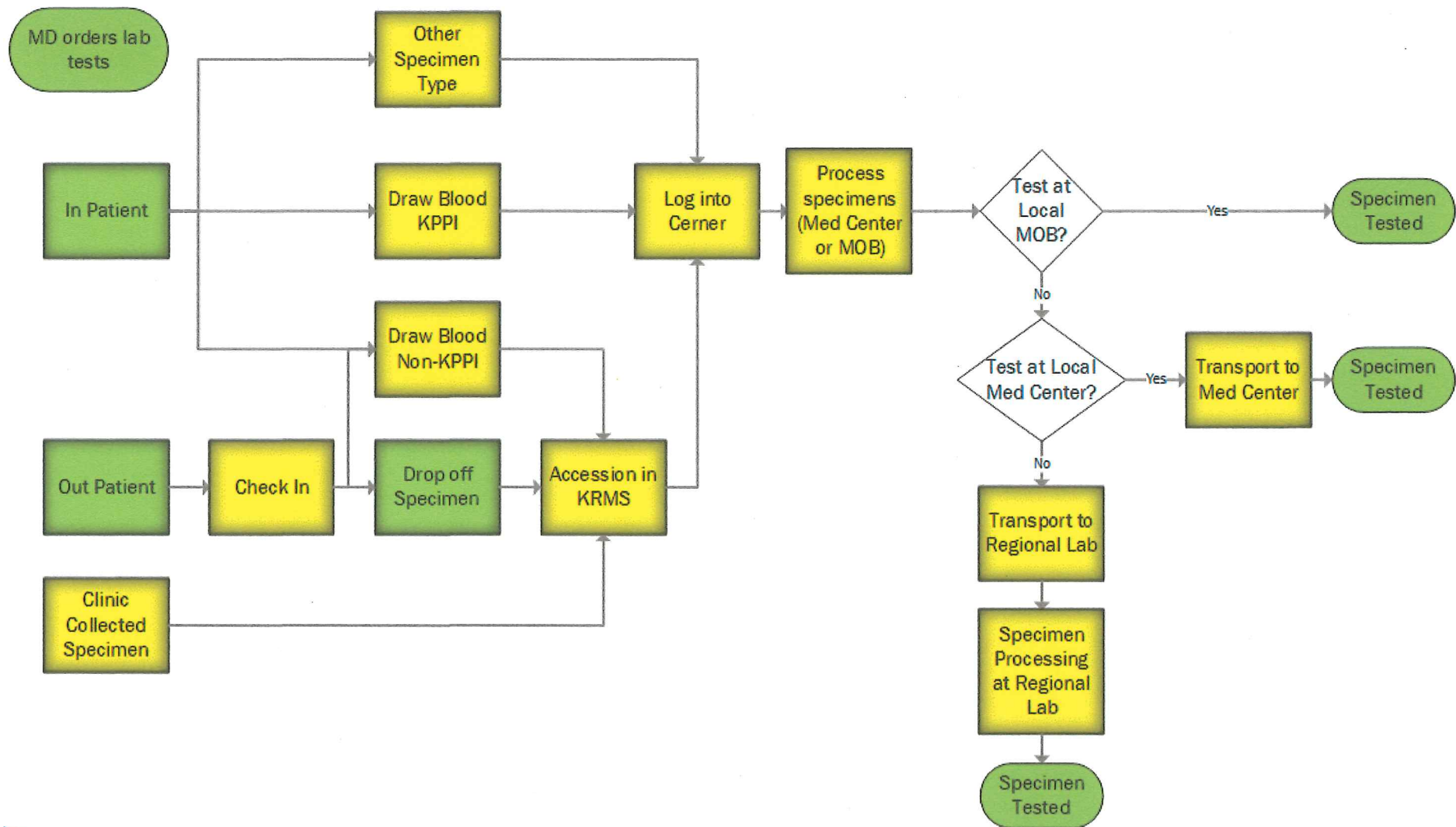


Who is our Customer?

- ▶ **Primary: Patient and Provider**
 - Patient and Provider expect accurate and timely test results 100% of the time
 - Patient is not willing to pay for defects (rejected specimens) and rework (having to come back for sample recollection)

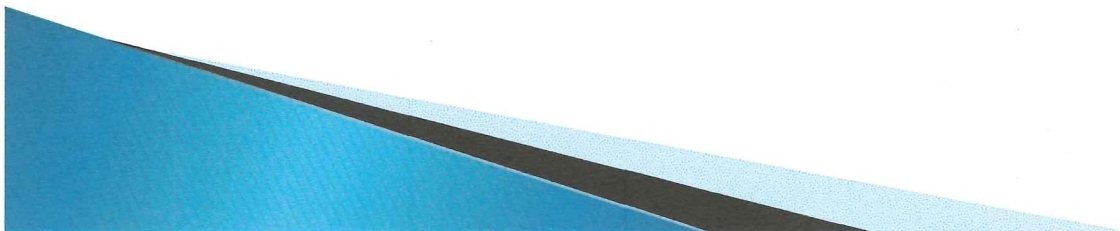
- ▶ **Secondary: Kaiser Permanente Enterprise**
 - Mission: To provide high-quality, affordable health care services
 - To retain competitive position





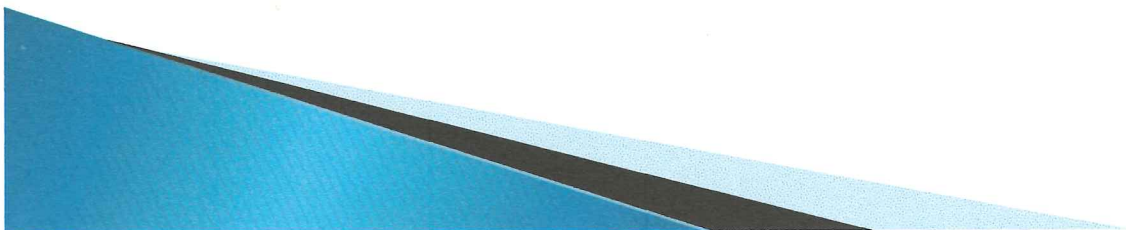
What is the Problem?

- ▶ Nearly 30 Million specimens sent to Regional Reference Lab (RRL) annually
 - Over 220,000 specimens rejected (0.7%) annually
- ▶ Nearly 108 Million specimens tested at local Medical Center labs annually
 - Over 300,000 specimens rejected (0.3%) annually



The Cost of Poor Quality and Re-work

- ▶ Local Lab staff wasting time investigating problem specimens
- ▶ Regional Lab staff wasting time searching for specimens and notifying MD
- ▶ MD wasting time responding to message and calling back patient
- ▶ Patient wasting time coming back in for re-collection of specimen



The Cost of Poor Quality

Human Resource	Cost per Year Rejects
Local Lab Staff	\$630,000
Regional Lab staff	\$770,000
MD staff	\$4,342,000
Total	\$5,742,000

Intangible	Result
Patient satisfaction	Low
Provider Satisfaction	Low
Delayed treatment of patient	High

Statistics show...



Rejected at Regional Lab

1. Duplicate Requests
2. Improperly Submitted
3. Accessioned in Error
4. No Specimen Received
5. QNS

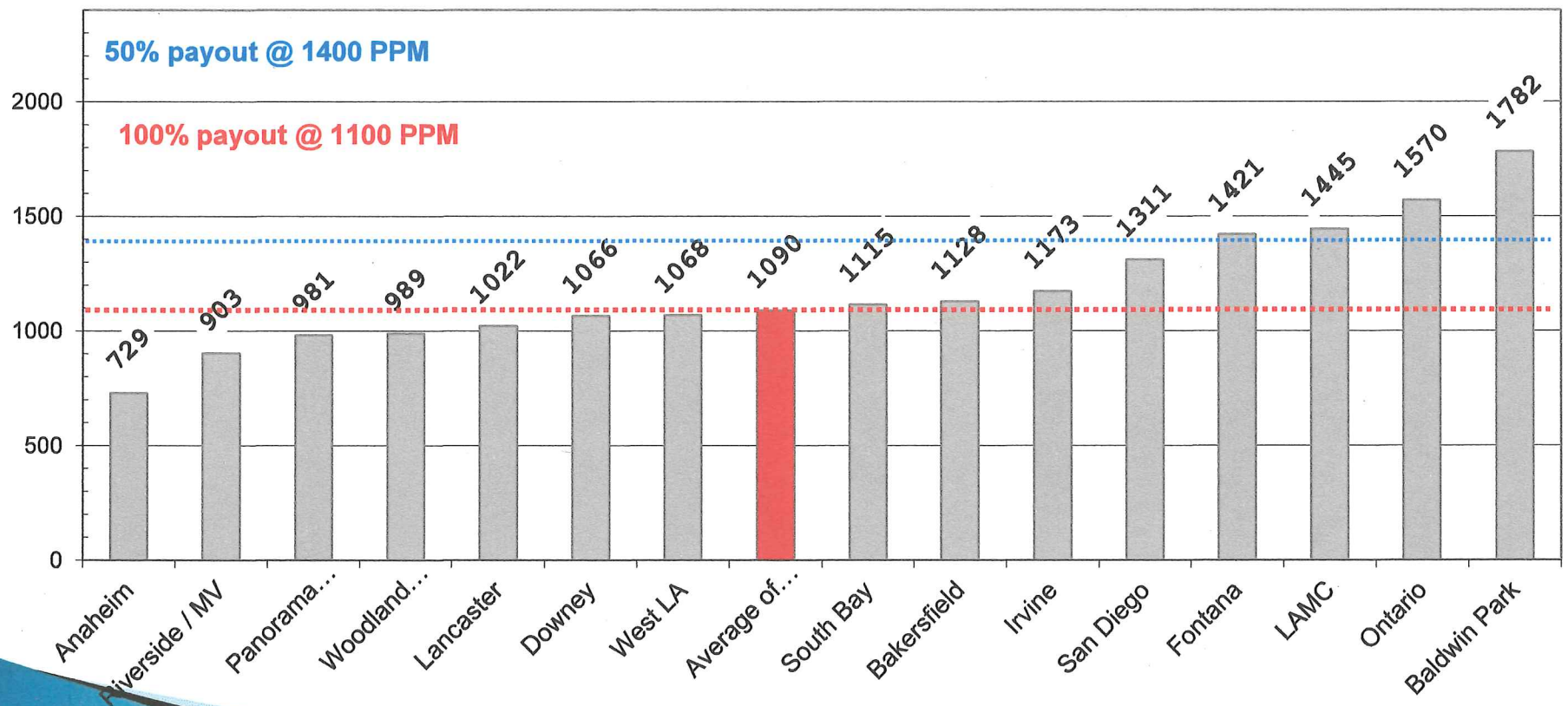
Rejected at
Local Med Center

1. Duplicate Request
2. Hemolyzed
3. No Specimen Received
4. Clotted
5. QNS

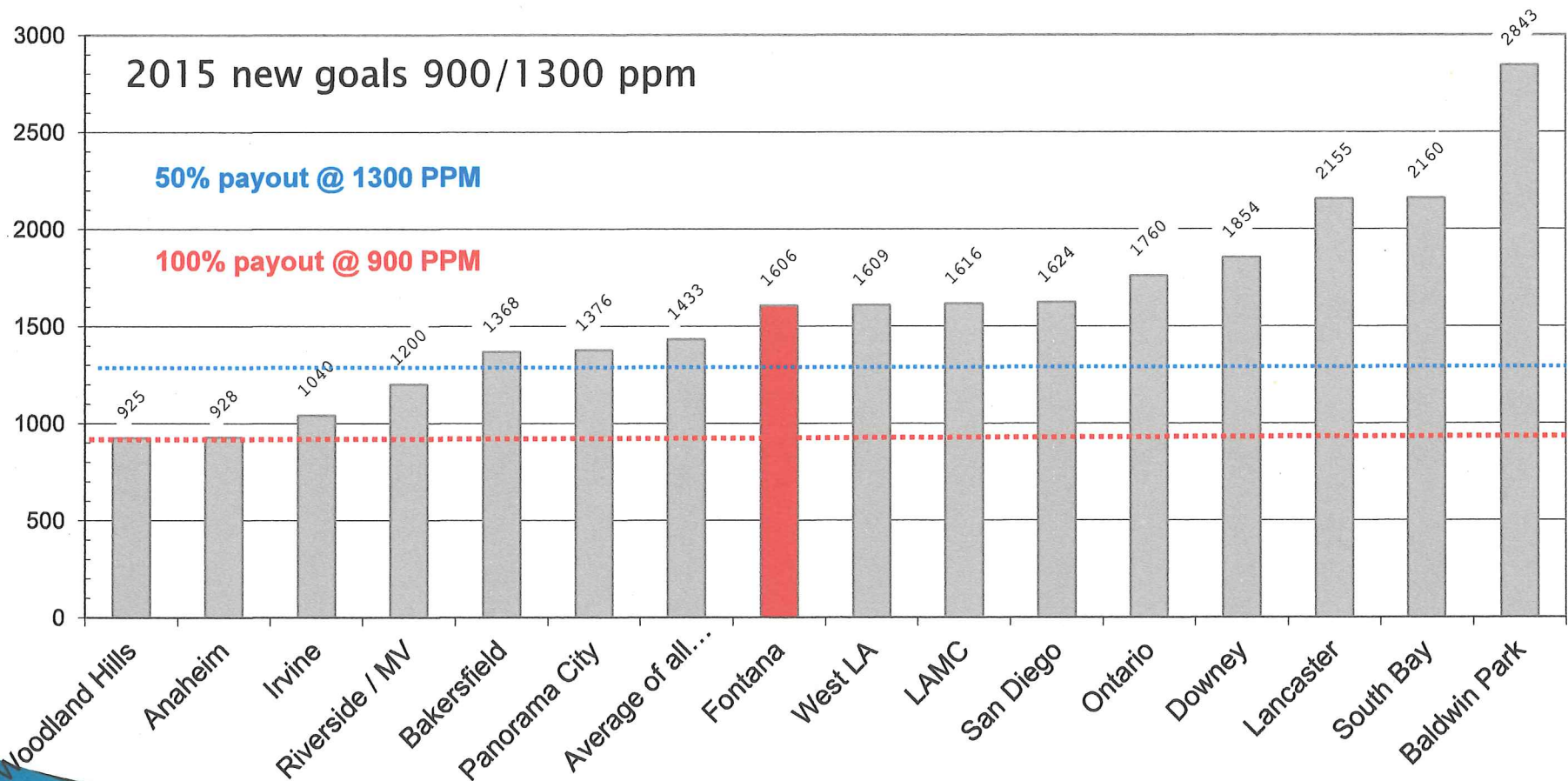
Rejected at Regional Lab

- ▶ Specimens Received at RRL
- ▶ Rejected at RRL
- ▶ Reported Monthly to Lab Administration (Fred's reports)
- ▶ Data Normalized to Parts Per Million (PPM)
 - # of rejected specimens X 1,000,000 / Total volume
- ▶ Payout Goals are defined

Average PPM, Year End 2014

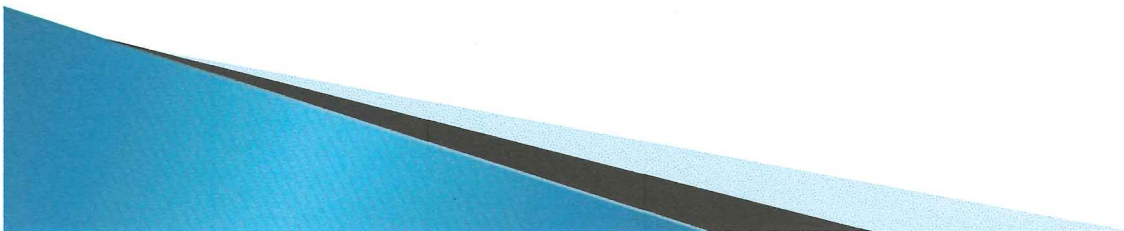


Average PPM, YTD 2015



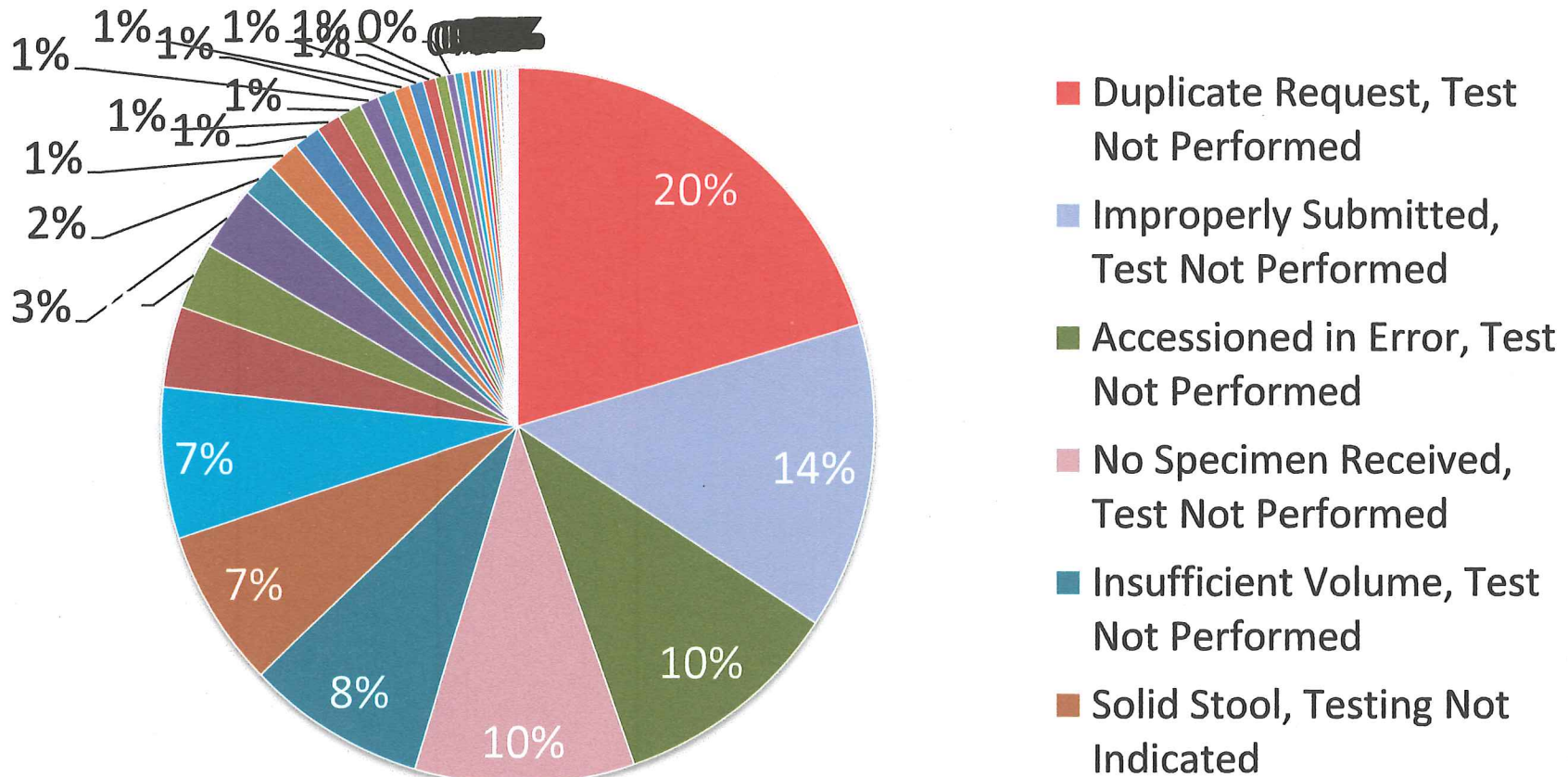
Why?

- ▶ Why are there so many rejected specimens?
- ▶ What are the reasons for the rejects?
- ▶ Lets look at February, 2015



February 2015

All reject reasons (excludes HPV)



#1 Duplicate Requests (20%)

- ▶ 20% of rejects
- ▶ Used for canceling a test when 2 or more orders for the same test are placed
- ▶ Physician orders duplicate tests
- ▶ Multiple physicians ordering same test on patient

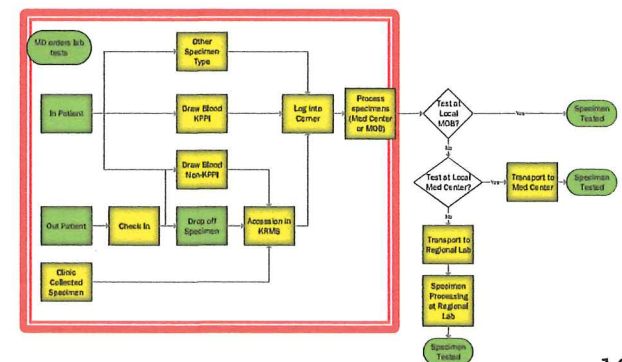
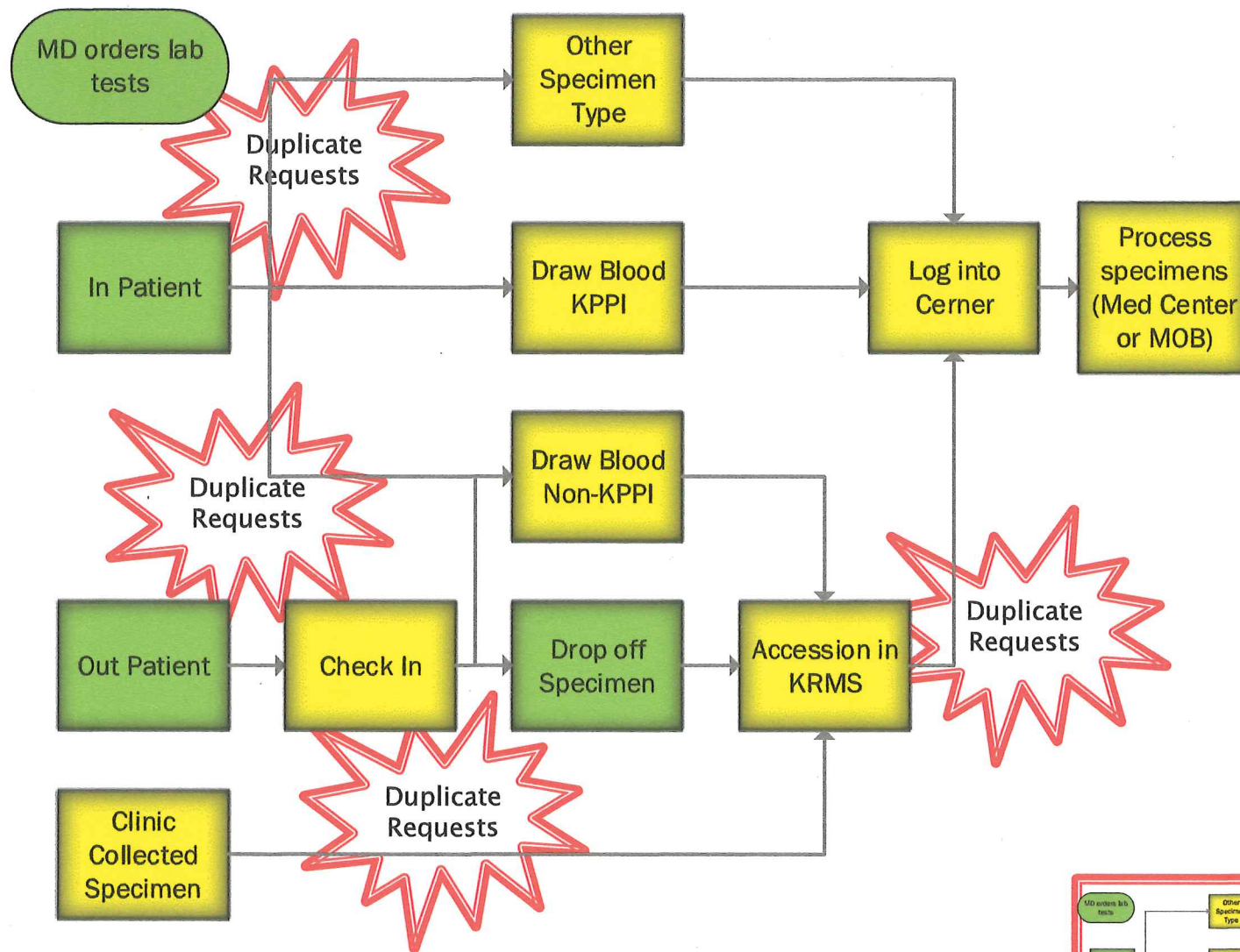
#1 Duplicate Requests

Current State

- ▶ Duplicate test request are being “linked” when patient checks into Lab
 - Inadequate training of check in staff
- ▶ Duplicate tests are accessioned in lab
 - Inadequate training of staff
 - Staff rushing, do not see duplicates

Future / Ideal State

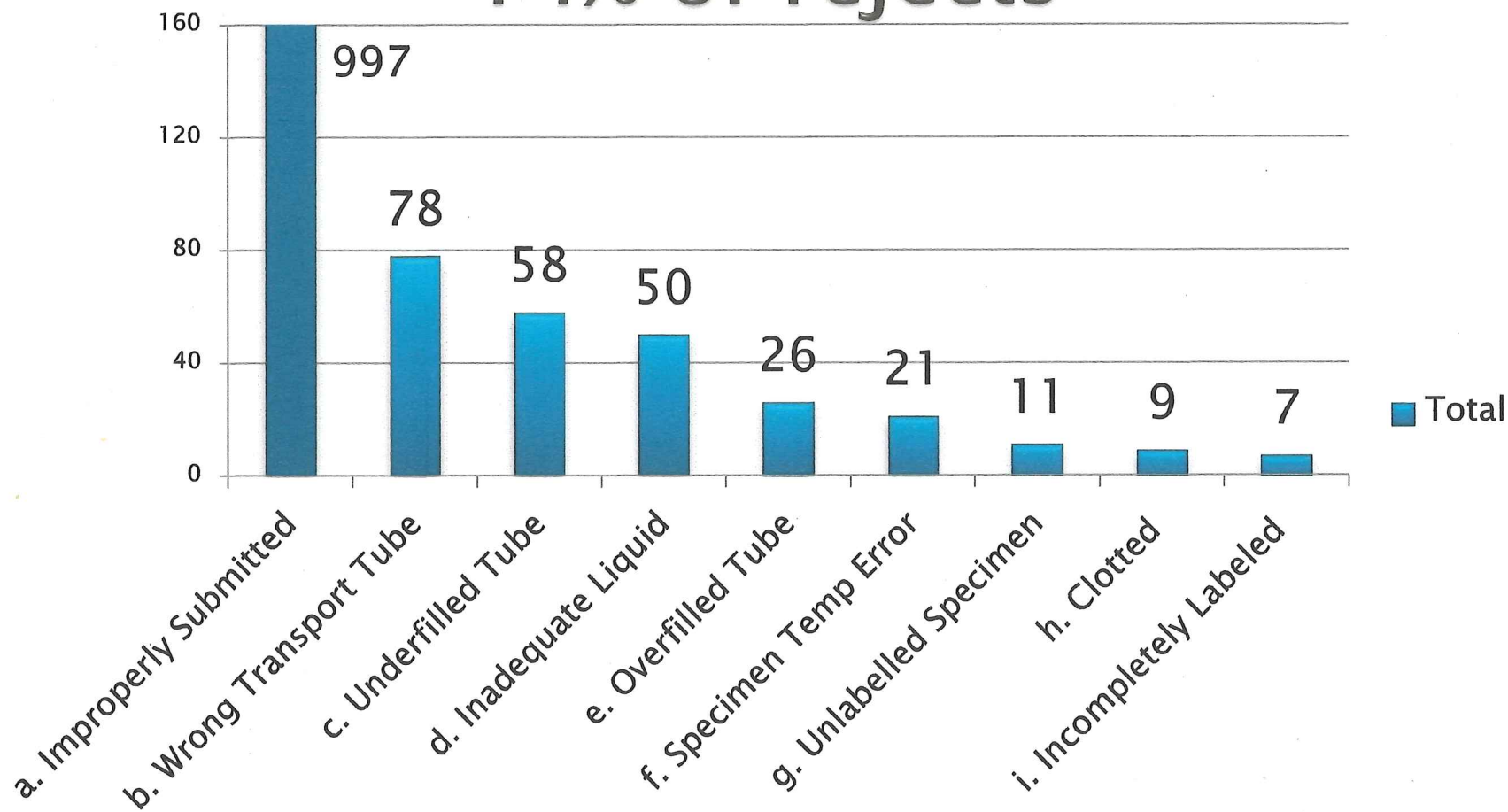
- ▶ **Future State:** Duplicate test requests do not get “linked”
- ▶ **Ideal State:** Computer systems delete the duplicate test orders upon entry, before patient gets to lab



#2 Specimen Improperly Submitted

February 1 207

14% of rejects



#2 Specimen Improperly Submitted

- ▶ A. Improperly Submitted
- ▶ Used generically when no more specific reason is available
 - Aliquot received, cannot use
 - Stool received, should be iFOBT
 - Many other reasons – comment can be found in Cerner result notes

Cerner Cancel Report Available

KP_GL_CANCEL_REPORT_SMW [Compatibility Mode] - Microsoft Excel

PATIENT_ID	PATIENT_FACILITY	CATALOG_DISP	ACCN	ORDER_STATUS	SERVICE_RESOURCE	COLLECT_PRSNL	CANCEL_CODE
0436	San Diego Area	Chlamydia GC Swab Amplified Probe	2-15-076-0	Canceled	SWL VIR TIGR#1	Medical Doctor , Coll	Improperly Submitted,
456	San Diego Area	Chlamydia GC Swab Amplified Probe	2-15-077-	Canceled	SWL VIR TIGR#1	Emergency Department	Improperly Submitted,
	Montana Area	Chlamydia GC Swab Amplified Probe	2-15-	Canceled	SWL VIR TIGR#1	Patient , Collect	Improperly Submitted,
	Anaheim Area	Chlamydia GC Swab Amplified Probe		Canceled	SWL VIR TIGR#1	Rubio, Cynthia	Improperly Submitted,
	Anaheim Area	Chlamydia GC Swab Amplified Probe		Canceled	SWL VIR TIGR#1	Emergency Department	Improperly Submitted,
	Flower Area	Chlamydia GC Urine Amplified Probe		Canceled	SWL VIR TIGR#1	Emergency Department	Improperly Submitted,
	San Diego Area	Clostridium difficile PCR		Canceled	SWL VIR GXprt16	Patient , Collect	Improperly Submitted,
	Anaheim Area	Dialysate Chem Pnl		Canceled	SWL DIMW Ord MP	RN , Collect	Improperly Submitted,
	Anaheim Area	Electrolytes		Canceled	SWL DIMW Ord MP	Cervantes, Maria D	Improperly Submitted,
	Anaheim Area	Electrolytes		Canceled	SWL DIMW Ord MP	RN , Collect	Improperly Submitted,
	San Diego Area	HIV 1 and 2 Antibody		Canceled	SWL IMM Cntaur	RN , Collect	Improperly Submitted,
	West LA Area	HPV CO Test Greater Than 29 Years		Canceled	SWL VIR Lumin#1	Medical Doctor , Coll	Improperly Submitted,
99	San Diego Area	HPV CO Test Greater Than 29 Years	2-15-076	Canceled	SWL VIR Lumin#1	RN , Collect	Improperly Submitted,
99	San Diego Area	Hep B Surface Antigen HBSAG	2-15-077-	Canceled	SWL IMM Cntaur	RN , Collect	Improperly Submitted,
99	Anaheim Area	Lipid Pnl	2-15-078-	Canceled	SWL DIMW Ord MP	Saliba, Jesse	Improperly Submitted,
1050	San Diego Area	Occult Blood Stool Immunoassay	2-15-078-0	Canceled	SWL SPD DIANA#1	Patient , Collect	Improperly Submitted,

Ready 16 of 4877 records found Count: 17 100%

Cerner Order Notes

Comments

Order Comment | Order Note

CTGC SW
2-15-078-041339

OBSTETRICS/GYNECOLOG / PROVIDER
CALL BACK: (000)000-0000 EXT: 0000 0000
PATIENT CONTACT NUMBER: (949)5051987

INCORRECT MEDIA
PROBLEM FORM FAXED TO ORDERING
FACILITY
BMB:AFF
3/20/15

Close Add Edit

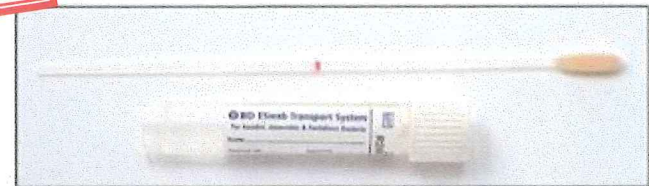
#2 Specimen Improperly Submitted

E-Swab

▶ B. Wrong Transport Tube

- Used for canceling a test order when a specific collection tube is required, but another tube is received
- e.g., E-Swab transport tube is required, but a Viral Culture transport tube is received

Viral Culture



Wrong Transport Tube

Current State

- ▶ Swabs
 - collected by providers
 - Cerner label very difficult to read
 - Lab not looking at Cerner label when applying to tube or accessioning

Future / Ideal State

- ▶ **Future State:**
 - Job Aid showing correct specimen container
 - Job Aid showing which collection label code needed for each test and specimen type
 - Reject the specimen locally before sending to RRL
- ▶ **Ideal State:** Test code on Cerner label prints in **BOLD** font for each swab type

Bacterial Culture



Regular ESwab Collection and Transport System for Aerobic, Anaerobic and Fastidious Bacteria: White Cap with liquid Amies for nose, throat, vaginal and wound specimens. Also use for adult/child MRSA Surveillance Culture specimens from nares.

KSN: EQ 1183
BD Product Number: 220245
Fisher Part Number: 22-349-700



Minitip ESwab Collection and Transport System for Aerobic, Anaerobic and Fastidious Bacteria: Green Cap with liquid Amies for eye, ear, nasal passage, nasopharynx, throat, urogenital tract and pediatric specimens. Also use for newborn MRSA Surveillance Culture specimens (NICU only).

KSN: EQ 1184
BD Product Number: 220246
Fisher Part Number: 22-349-701

ESwabs Replace These Products (Use Until Supplies Are Depleted)



Aerobic Culture
BBL™ CultureSwab™ Plus
(Amies)
KSN: EQ 0099



GC Culture
BBL™ CultureSwab™ Plus
(Amies with Charcoal)
KSN: EQ 1182



Throat Culture
BD Falcon SWUBE*
(Dual Swab Sterile)
KSN: EK 1160

* Use SWUBE for Wet Prep (Trichomonas).
Dermatology/Fungal: OK to use SWUBE for
skin, nails and hair clippings.

Anaerobic Culture

Swab or Tissue



Port-A-Cul Tube
Collection and
Transport System for
Anaerobic Bacteria

KSN: EK 6001
BD Product Number: 221606

Fluids



Port-A-Cul Vial
Collection and
Transport System for
Anaerobic Bacteria

BD Product Number: 221608

Virology Specimen Collection



Collection and Transport
System for Viral Culture,
Chlamydia Culture, Herpes
Culture, VZV Culture,
Mycoplasma/Ureaplasma
Culture and RSV STAT Antigen

KSN: EK 1677
BD Product Number: 220527
Fisher Part Number: B220527


Bordetella pertussis PCR



Bordetella pertussis PCR Specimen Collection Kit
(Swab Packet + Instruction Card)
TheraPak Product # 38284


CLAUSE SR., SANTA RT
 1 SUN FPL FP M 25-DEC-1897
 COLL. INFO:

 2-15-118-023416
 C MISA
 Micro Sa SWL AMB Mic

NANCY PT
 908 SD CLM FP PC 2 F 29-DEC-19
 14-APR-2015 15:23 MDC

 2-15-104-057176A
 CTGC SW SWL AMB Vir

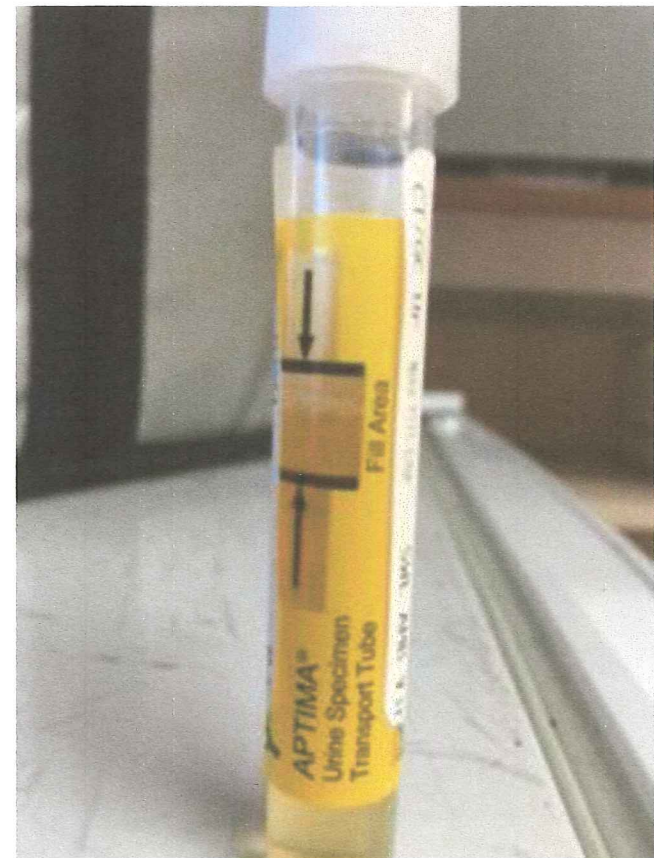
SHERRY RT
 1470 SD MC GFRR RECR-01 F 14-OCT-19
 14-APR-2015 10:05 MDC

 2-15-104-018090
 C STERILE
 Str1Cont SWL AMB Mic

NICHELE E RT
 132 DSCH F 26-OCT-19
 14-APR-2015 10:25 PTC

 2-15-104-025764A
 CTGC U Note Fill Line SWL AMB Vir

#2 Specimen Improperly Submitted

- ▶ C. Underfilled tube
 - Intended for canceling a Chlamydia/GC Urine molecular screen test order when the level of urine in the transporter is below the minimum fill line



Underfilled tube – CT/GC Urine

Current State

- ▶ Lab staff misjudging level of urine in primary collection container
- ▶ Lab staff or Provider office staff not filling transport tube to correct level
- ▶ Inadequate training

Future / Ideal State

- ▶ **Future State:**
 - Job aid for minimum urine volume needed for this test
 - In-service on how to use the transport tube pipette
 - Reject these locally, do not forward these to RRL

Urine Test Volume Job Aid

Test	Collection Label Code	Minimum volume required (mL)	Container needed	Time to put urine into transport tube
Urinalysis	UANOmicro	10	UR25 or UR10 (yellow top)	refrigerate if greater than 2 hours, stable at refrigerated temperature for 24 hours
Culture	URCUL	4	UTT (Grey top with preservative)	Transfer within 2 hours to plastic gray top (boric acid) urine transport tube
Culture	URCUL	less than 4	Plate	Plate at Med Center or MOB by CLS
CT/GC	CTGC U	3	Gen Probe APTIMA Tube	Urine level must be between the 2 black lines on the tube = 2mL
Creatinine (random)	Creat U	10	UR10 (Yellow top)	
Protein (random)	Pro_Cre U	10	UR10 (Yellow top)	
Microalbumin (random)	MAU U	10	UR10 (Yellow top)	not specified
Drug Screen Med Center	UDS Triage	10	UR10 (Yellow top)	
Drugs of Abuse Screen	DAU	25	Random Urine	
Immunofixation	IMFX U	20	Random Urine	

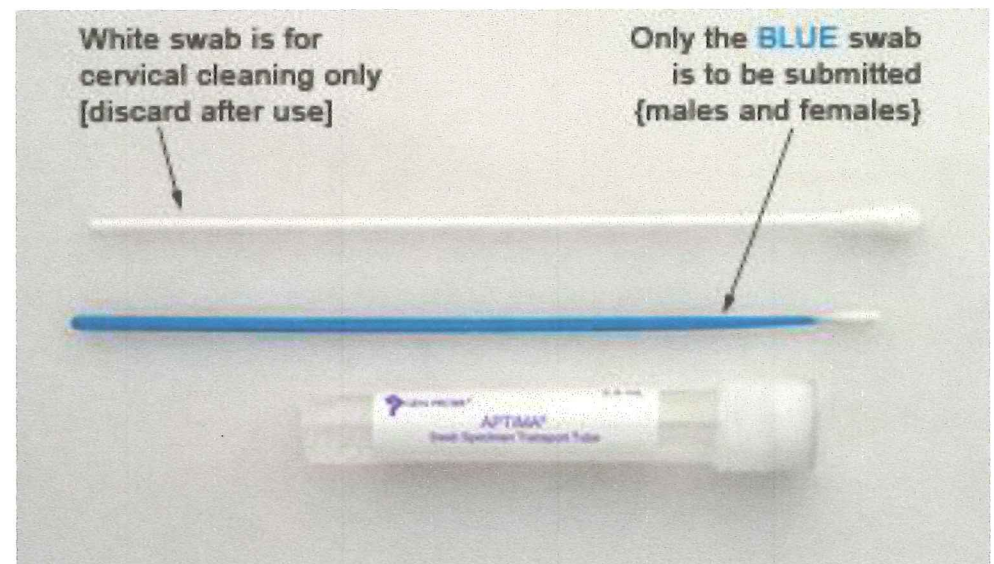
Pipette with markings in kit



#2 Specimen Improperly Submitted

▶ D. Inadequate Liquid

- The Intended for use in canceling a Chlamydia/ GC molecular screen (swab) when the instrument repeatedly determines that the level of transport media in the tube is inadequate for completion of the test



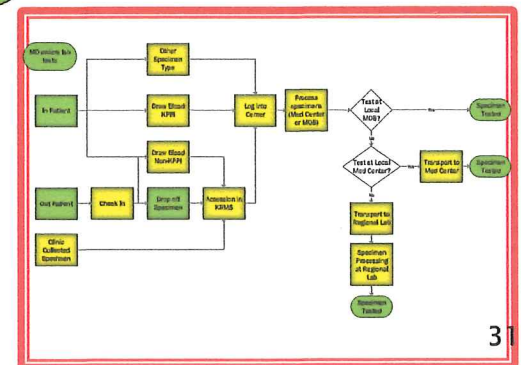
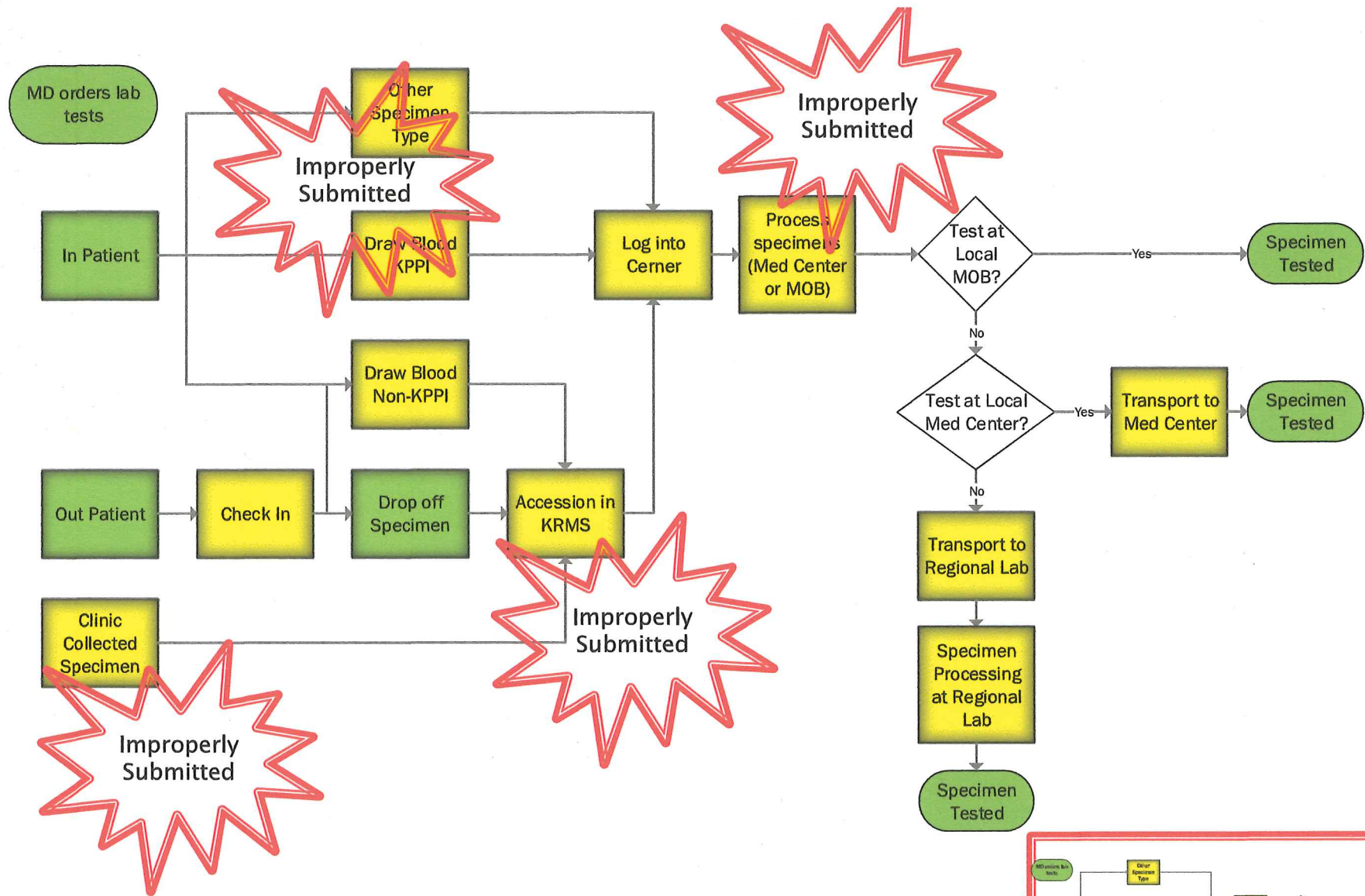
Inadequate Liquid

Current State

- ▶ Collected by providers
- ▶ Sometimes received with no liquid
- ▶ Liquid being dumped out or leaking

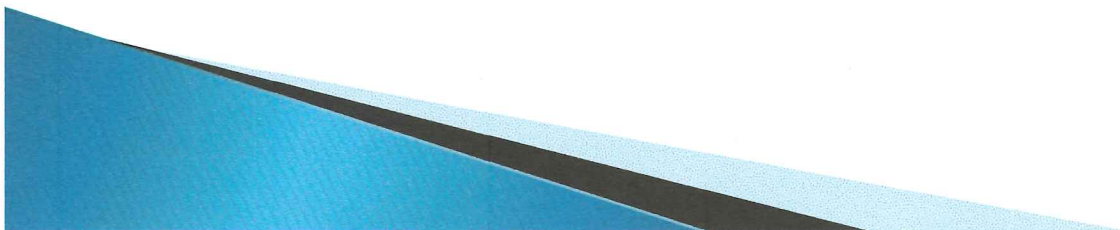
Future / Ideal State

- ▶ In-service on how to use the transport tube
- ▶ Reject these locally, do not forward these to RRL



#3 Test Accessioned in Error

- ▶ 10% of rejects
- ▶ Used when cancelling a test that should not have been accessioned



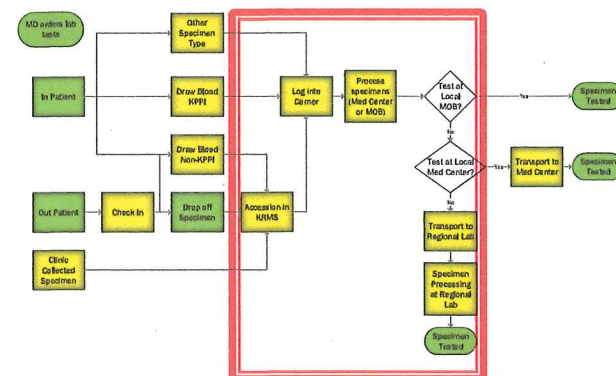
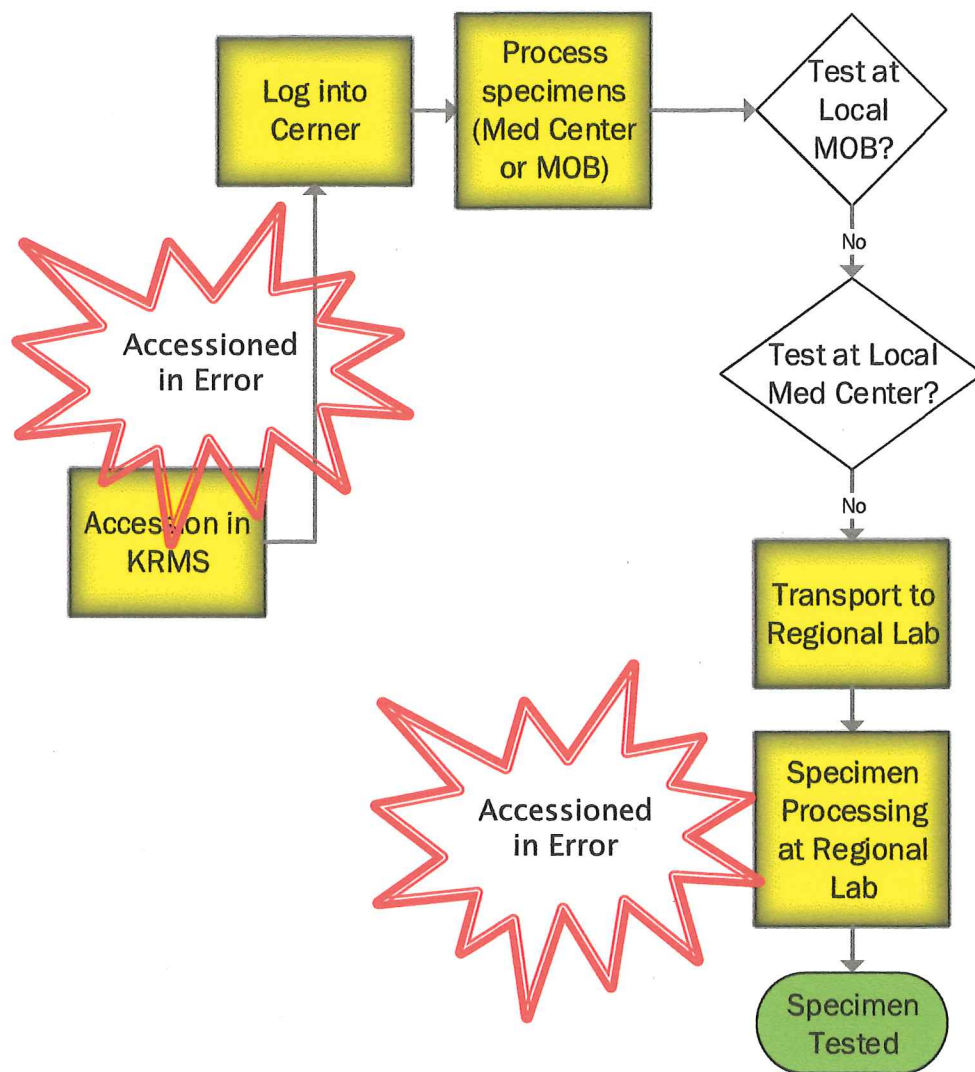
#3 Test Accessioned in Error

Current State

- ▶ Lab staff selecting tests at accessioning step when they should not have been selected
- ▶ Unable to cancel accession without canceling the Health Connect order
- ▶ Lack of training and job tools

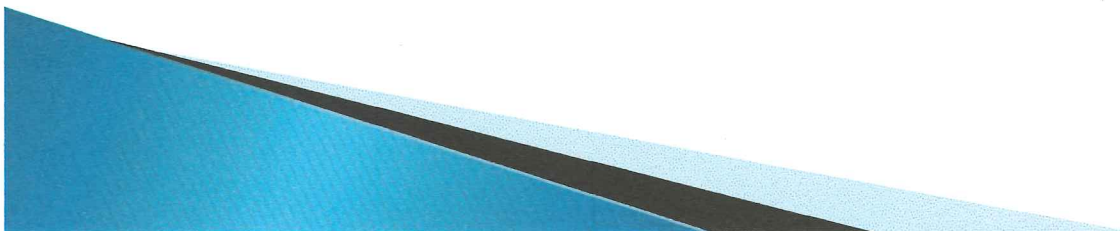
Future / Ideal State

- ▶ **Future State:**
 - Train staff to only accession tests that they have a specimen for
- ▶ **Ideal State:**
 - System allows cancellation of accession without canceling test order



#4 No Specimen Received

- ▶ 10% of rejects
- ▶ Used when a specimen is accessioned but not received at the Performing Location, and no other specimen is available for retrieval
- ▶ Current process does not allow cancel of accession without cancelling the order.



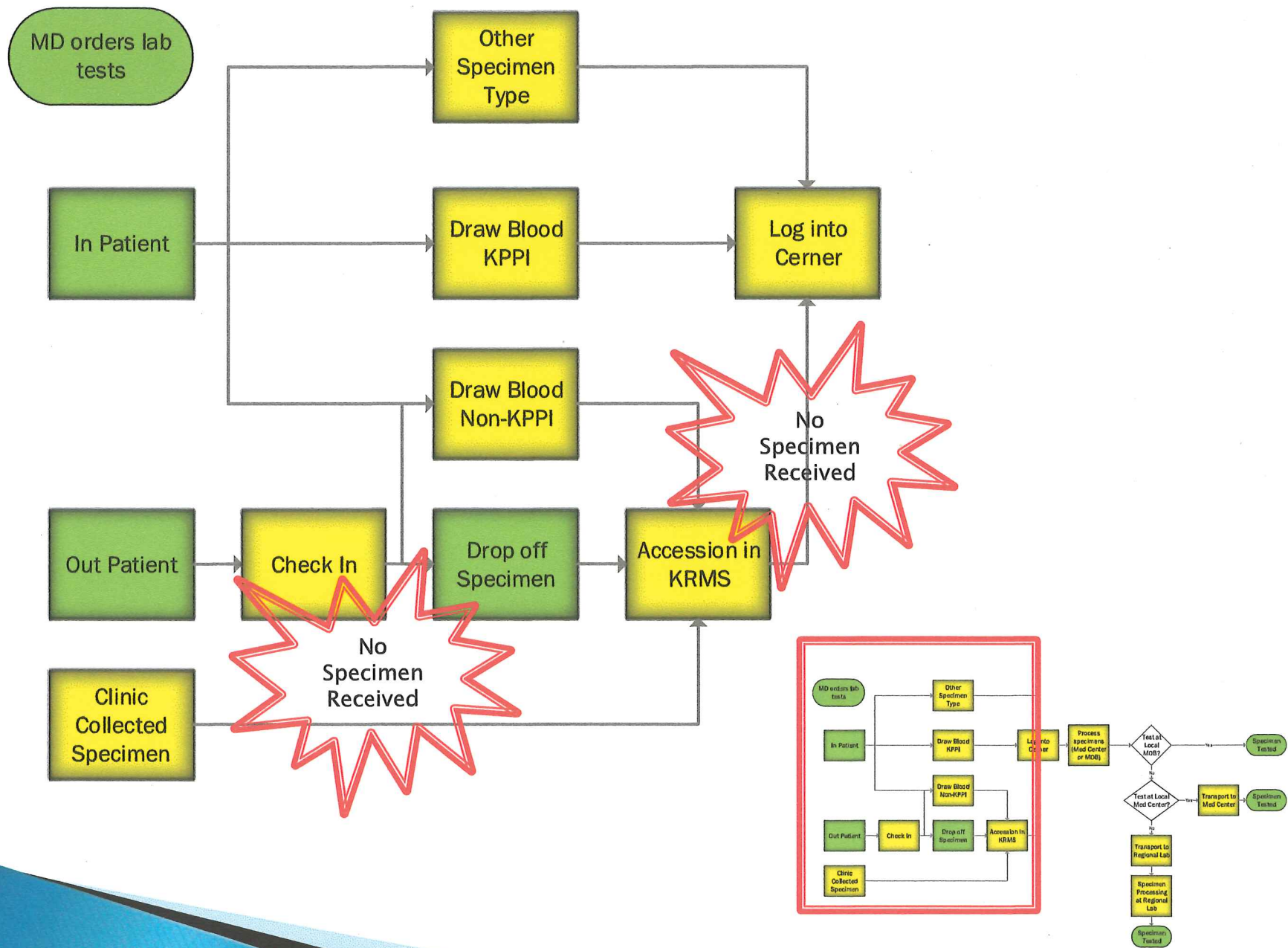
#4 No Specimen Received

Current State

- ▶ Test is accessioned in KRMS when it should not have been
- ▶ System does not allow canceling of accession without canceling order
- ▶ Rushing, lack of attention to detail

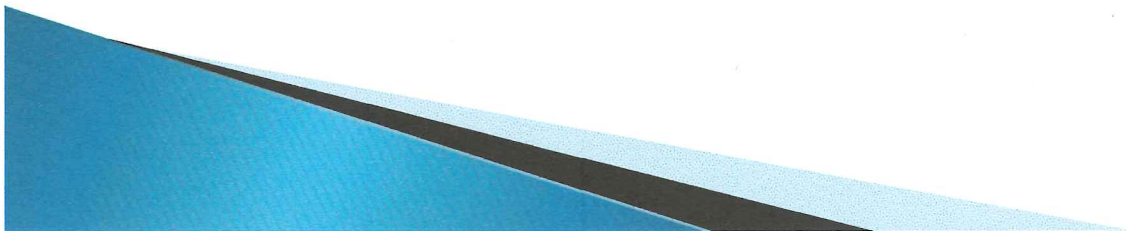
Future / Ideal State

- ▶ **Future State:**
 - In-service on accessioning orders
 - Reject these locally, do not forward these to RRL
- ▶ **Ideal State:**
 - System would allow user to cancel the accession without canceling the order in KPHC



#5 Quantity Not Sufficient (QNS)

- ▶ 8% of rejects
- ▶ Used when a specimen is QNS for testing and no additional specimen from the same collection date and time, and within the established stability limits for the designated tests is available for retrieval
- ▶ Completely within control of the lab
- ▶ Urine v. Blood



#5 Quantity Not Sufficient – Blood

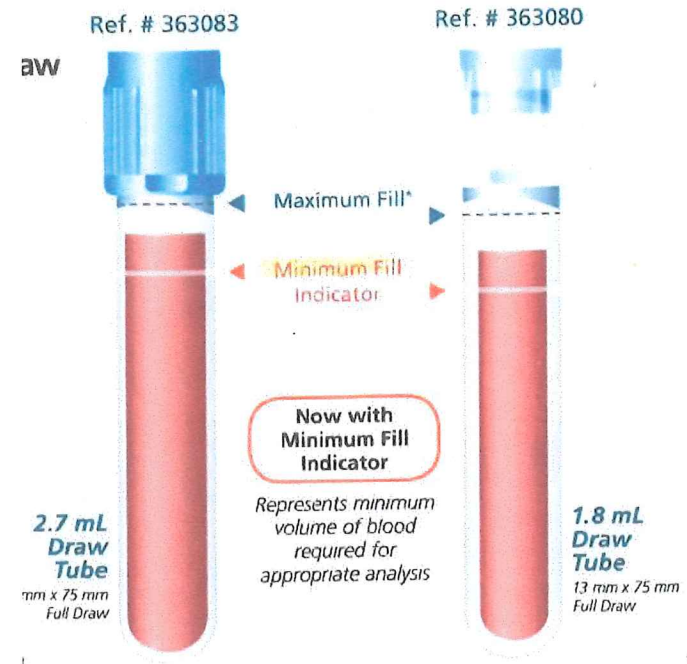
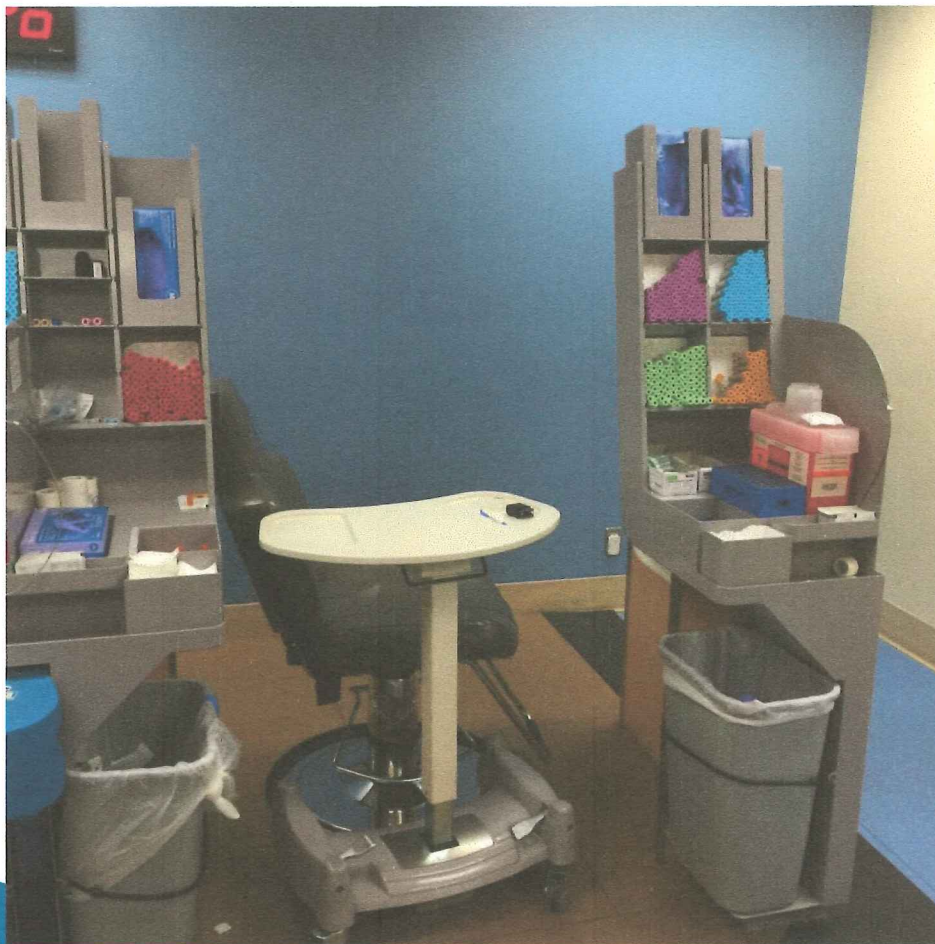
Current State






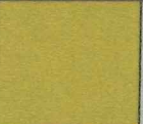

- ▶ Phlebotomist in a hurry to collect blood
- ▶ Tubes not filled to proper volume
- ▶ System does not allow canceling of accession
- ▶ Lack of training

Future / Ideal State

- ▶ **Future State:**
 - Job aid with pictures of tubes with proper volumes shown
 - Standardized Draw Stations with Job Aid
- ▶ **Ideal State:**
 - System would allow user to cancel the accession without canceling the order in KPHC

Standardized Phlebotomy Station with Visual Controls



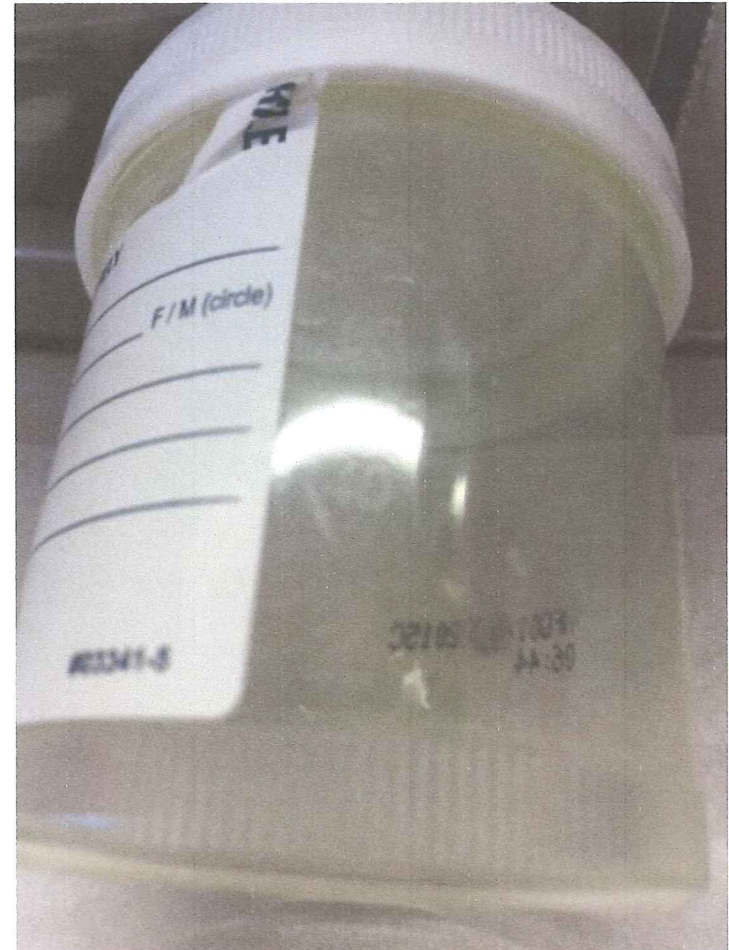
Order of Draw	Stopper Color	Tube	Common Tests/Notes
1	varies	<ul style="list-style-type: none"> Blood culture bottles Yellow top SPS tubes Any other test that must be sterile 	Blood culture bottles, yellow stopper with sodium polyanethol sulfonate (SPS)
2		<ul style="list-style-type: none"> Light blue top Contains sodium citrate anticoagulant Tests run on plasma 	<ul style="list-style-type: none"> PT, PTT, TT, specific coagulation factor assays such as Factor VIII Tube must be filled to capacity for accurate test results
3		<ul style="list-style-type: none"> Red top with no additives Gold top with clot activator (micronized silica particles) and gel (polymer) for barrier Red/black top with clot activator (micronized silica particles) and gel (polymer) for barrier Tests run on serum 	<ul style="list-style-type: none"> For chemistry and serology tests that are performed on serum Tubes with gel barriers cannot be used for most therapeutic drug testing
4		<ul style="list-style-type: none"> Green top with lithium or sodium heparin as anticoagulant 	<ul style="list-style-type: none"> For chemistry tests that are performed on plasma Tests for lithium should not be collected into green top tubes containing lithium heparin
5		<ul style="list-style-type: none"> Lavender (purple) top with liquid EDTA anticoagulant (glass tube) or spray-dried EDTA anticoagulant (plastic tube) Pink top with spray-dried EDTA anticoagulant 	<ul style="list-style-type: none"> Lavender top: whole blood hematology tests such as CBC, H&H, WBC, reticulocyte count, platelet count, and more Pink top: all blood bank tests; tube has label that meets AABB requirements for patient identification
6		<ul style="list-style-type: none"> Gray top with sodium fluoride as glycolytic inhibitor Some tubes have potassium oxalate or EDTA as anticoagulant 	Serum/plasma glucose
7		<ul style="list-style-type: none"> Yellow top Solution A or Solution B acid citrate dextrose (ACD) solution 	Some flow cytometry tests, HLA (white blood cell) typing and crossmatch for organ/bone marrow transplant; specific labs may specifically request Solution A or Solution B
8		All other tubes in no particular order unless otherwise instructed (black, navy, tan top tubes) *See following page.	

***Special notes**

- Other tubes
 - Black top tube: contains sodium citrate anticoagulant; used only for erythrocyte

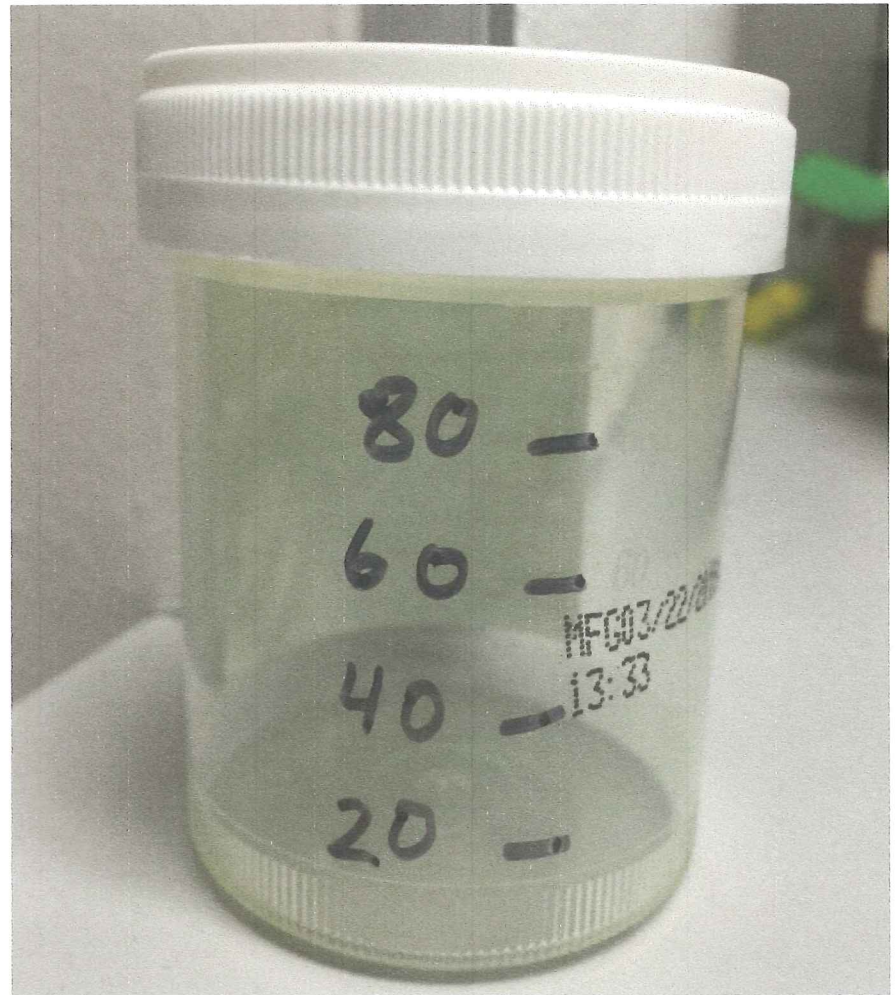
#5 QNS Urines – Current State

- ▶ No standardized guide for minimum urine volumes
- ▶ Lab Assistants not licensed to measure volume
- ▶ mL markings on Urine collection cups very difficult to read



#5 QNS Urines – Future State

- ▶ Job aid with picture of urine cups with markings available to all staff including Central Check In staff



Urine Test Volume Job Aid

Test	Collection Label Code	Minimum volume required (mL)	Container needed	Time to put urine into transport tube
Urinalysis	UANOmicro	10	UR25 or UR10 (yellow top)	refrigerate if greater than 2 hours, stable at refrigerated temperature for 24 hours
Culture	URCUL	4	UTT (Grey top with preservative)	Transfer within 2 hours to plastic gray top (boric acid) urine transport tube
Culture	URCUL	less than 4	Plate	Plate at Med Center or MOB by CLS
CT/GC	CTGC U	3	Gen Probe APTIMA Tube	Urine level must be between the 2 black lines on the tube = 2mL
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Protein (random)	Pro_Cre U	10	UR10 (Yellow top)	
Microalbumin (random)	MAU U	10	UR10 (Yellow top)	not specified
Drug Screen Med Center	UDS Triage	10	UR10 (Yellow top)	
Drugs of Abuse Screen	DAU	25	Random Urine	
Immunofixation	IMFX U	20	Random Urine	

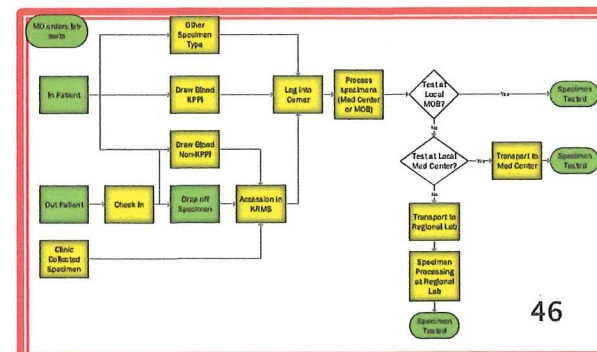
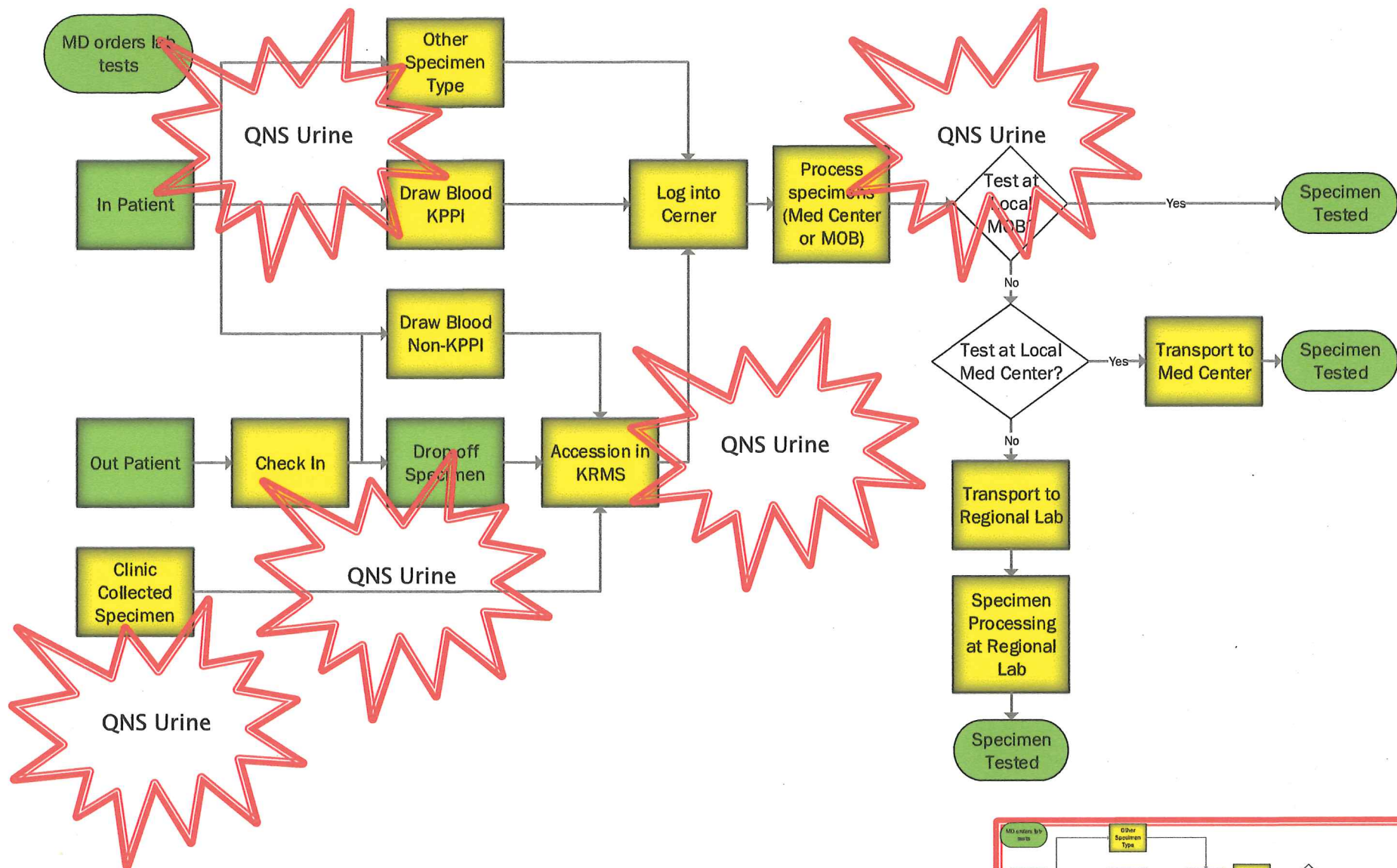
#5 Quantity Not Sufficient – Urines

Current State

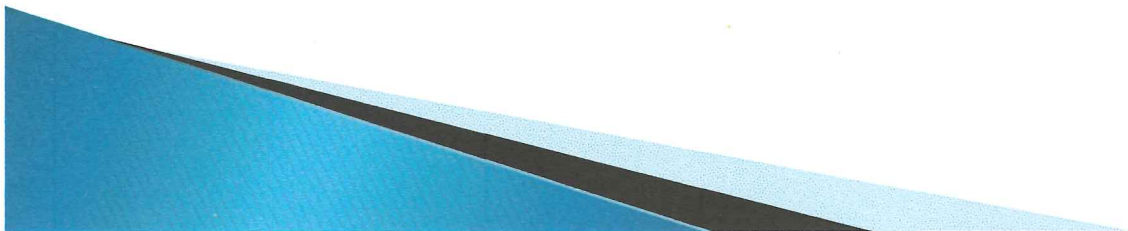
- ▶ Mainly caused by “linking” or accessioning of the urine orders before the sample is received
- ▶ System does not allow canceling of accessioned orders
- ▶ Lack of training

Future State

- ▶ **Future State:**
 - Do not link or accession urine order until specimen is received
 - Job aids at each work station
- ▶ **Ideal State:**
 - System would allow user to cancel the accession without canceling the order in KPHC
 - Manufacturer of urine cups will make markings on cups easier to read



Local rejects



Statistics show...

Rejected at Regional Lab

1. Duplicate Requests
2. Improperly Submitted
3. Accessioned in Error
4. No Specimen Received
5. QNS

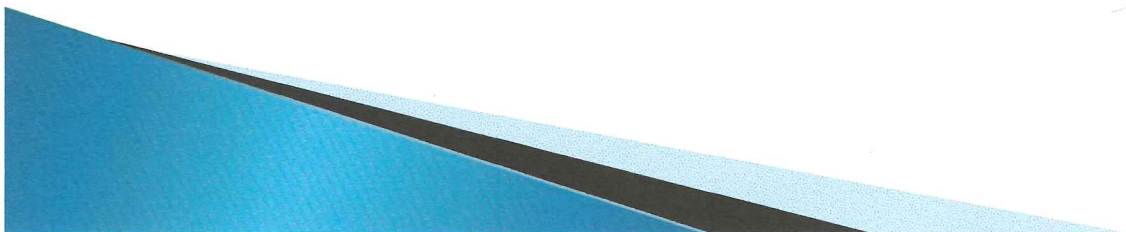
Rejected at Local Med Center



1. Duplicate Request
2. Hemolyzed
3. No Specimen Received
4. Clotted
5. QNS
6. Accessioned in Error

#2 Local: Hemolyzed

- ▶ Second most common reason for local rejects
- ▶ Used when the hemolysis index of the specimen exceeds the maximum allowed for the designated test



#2 Local: Hemolyzed

Current State

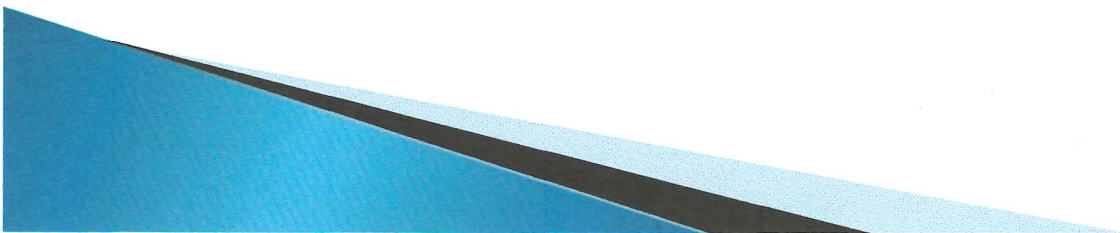
- ▶ Nurse collect v Lab collect
- ▶ May be caused by inadequate mixing or drawing with syringe
- ▶ Lack of education

Future State / Ideal State

- ▶ **Future State:**
 - Job Aid for nurses, order of draw
 - In-service for nurses on proper mixing of samples during collection and syringe or line draws

#4 Local: Clotted

- ▶ 4th most common reason for local rejects
- ▶ Used when red cell clumping precludes obtaining a valid test result



#4 Local: Clotted

Current State

- ▶ Specimens not mixed after collection
- ▶ Specimens stored on their sides instead of upright in racks after collection
- ▶ Nurse collect v. Lab collect

Future State / Ideal State

- ▶ Future state:
 - Racks at each draw station to stand tubes up in and separate by:
 - Centrifuge
 - Do not centrifuge
- ▶ Ideal State:
 - Computer to log in at each draw station
 - Single piece flow

Implementation

Future State

- ▶ Job Aids
 - Urine Volume
 - Blood Tube fill lines
 - Culture Media
 - Collection Labels
 - Standardized draw stations
- ▶ Staff Training
 - Linking
 - Accessioning
 - Pipetting
 - Specimen mixing
 - Keep specimens upright in racks for clotting

Ideal State

- ▶ Computer System deletes duplicate orders
- ▶ Test codes on Cerner labels print in **BOLD**
- ▶ System allows user to cancel accession without canceling the order
- ▶ Urine cups have readable markings

Implementation: Training

- ▶ Create “Laboratory” specimen guide
 - Include information on selection and use of collection and transport containers
 - Review this guide annually (regional pre-analytic group)
 - Make guide available on Lab Net
- ▶ On-site training with Lab Specimen Guide
 - All lab staff
 - All providers – via Nurse and Physician Educators
 - Include in new hire training and annual competency

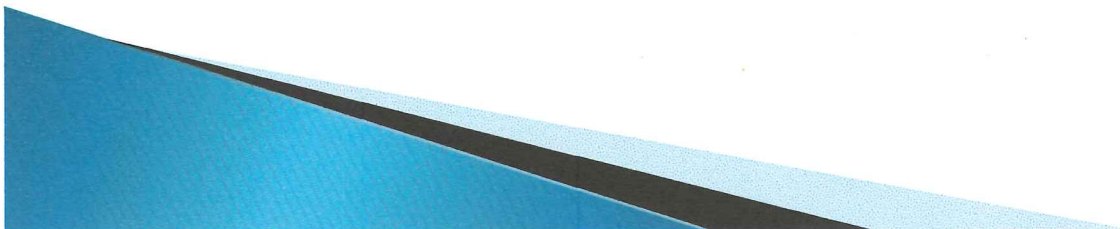
Bottom Line

	Current State
Cost of Rejected Specimens	\$5,742,000

	Future State (20% less rejects)	Future State (40% less rejects)	Ideal State (60% less rejects)
Cost of Rejected Specimens	\$4,593,600	\$3,445,200	\$2,296,800
Savings	\$1,148,400	\$2,296,800	\$3,445,200

Lessons Learned

- ▶ Go to the Gemba
- ▶ “What’s measured improves”, Peter Drucker
- ▶ Standardization is difficult but necessary
- ▶ Cannot assume skills are hard-wired (pipette example)
- ▶ Staff continuous education is key to success
- ▶ Visual controls are necessary



Questions?

